# 580046 REFERENCE

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**DESCRIPTION** 

LEGEND (SOIL & ROCK)

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PROFILES

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#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY McDOWELL	
PROJECT DESCRIPTION	BRIDGE NO. 46 ON SR II35
	OVER CROOKED CREEK
SITE DESCRIPTION	

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-580046	1	14

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, CEDTECHNICAL ENGINEERING UNIT AT (1919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU LIKEN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE DESTREY DATA THE VIEW OF THE STANDARD TEST METHOD. THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY YARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS,

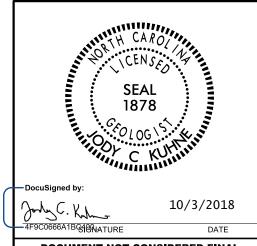
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DIES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS FOR THE THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:

  1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

  2. BY HAVING REDUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL
CD JOHNSON
DO CHEEK
CJ COFFEY
INVESTIGATED BY
DRAWN BYJC_KUHNE
CHECKED BYDC_ELLIOTT
SUBMITTED BYJC_KUHNE
DATE8/24/20I8



DOCUMENT NOT CONSIDERED FINAL **UNLESS ALL SIGNATURES COMPLETED** 

PROJECT REFERENCE NO	SHEET NO.
SF 58004	5 2 <b>OF</b> 14

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTALLINE CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. (≤ 35% PASSING "200) (> 35% PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE. <u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-5 A-2-6 A-2-7 A-3-4 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL COOCGOOGG	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
7. PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR SILI- MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN SOLS SOILS SOI	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL 40 MX 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 8 8 8 4 4 MX 8 MX 12 MX 16 MX NO MX AND SOLLS  ORGANIC SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLOYEY SILTY CLOYEY MATTER	√     WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN PATING	<u> </u>	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	<u> </u>	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/FT=)	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE	SOIL SYMBOL  SOIL SYMBOL  SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50  VERY DENSE > 50	THAN ROADWAY EMBANKMENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	── INFERRED SOIL BOUNDARY    ─────────────────────────────────	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY   SOFT   2 TO 4   0.25 TO 0.5     SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0	INFERRED ROCK LINE MN MONITORING WELL TEST BORING	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL   STIFF   8 TO 15   1 TO 2	WITH CORE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4  HARD > 30 > 4	TTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS  VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	LICED IN THE TOP 2 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.  MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE COURSE TO STATE AND STATE OF SCALES AND STATE OF STATE O	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC SEMISOLID; REQUIRES DRYING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RAINGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BM - 1
"" PL L PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	-BL- STA 9+76.36 59.28' LT
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: 1409.95 FEET
SL _ SHRINKAGE LIMIT	X CME-45C CLAY BITS AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS ELIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	
PLASTICITY	CME-55   CORE SIZE:	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N XWL	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	X TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST X CASING X W/ ADVANCER HAND TOOLS:	GENILE BLUW BY HAMMER DISINIEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG,-CARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT SOCIOENTO TOST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED  SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;  SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
		SHIFTEE BILENIS MCHUSS UNHINS.	DHIC: 0-13-14

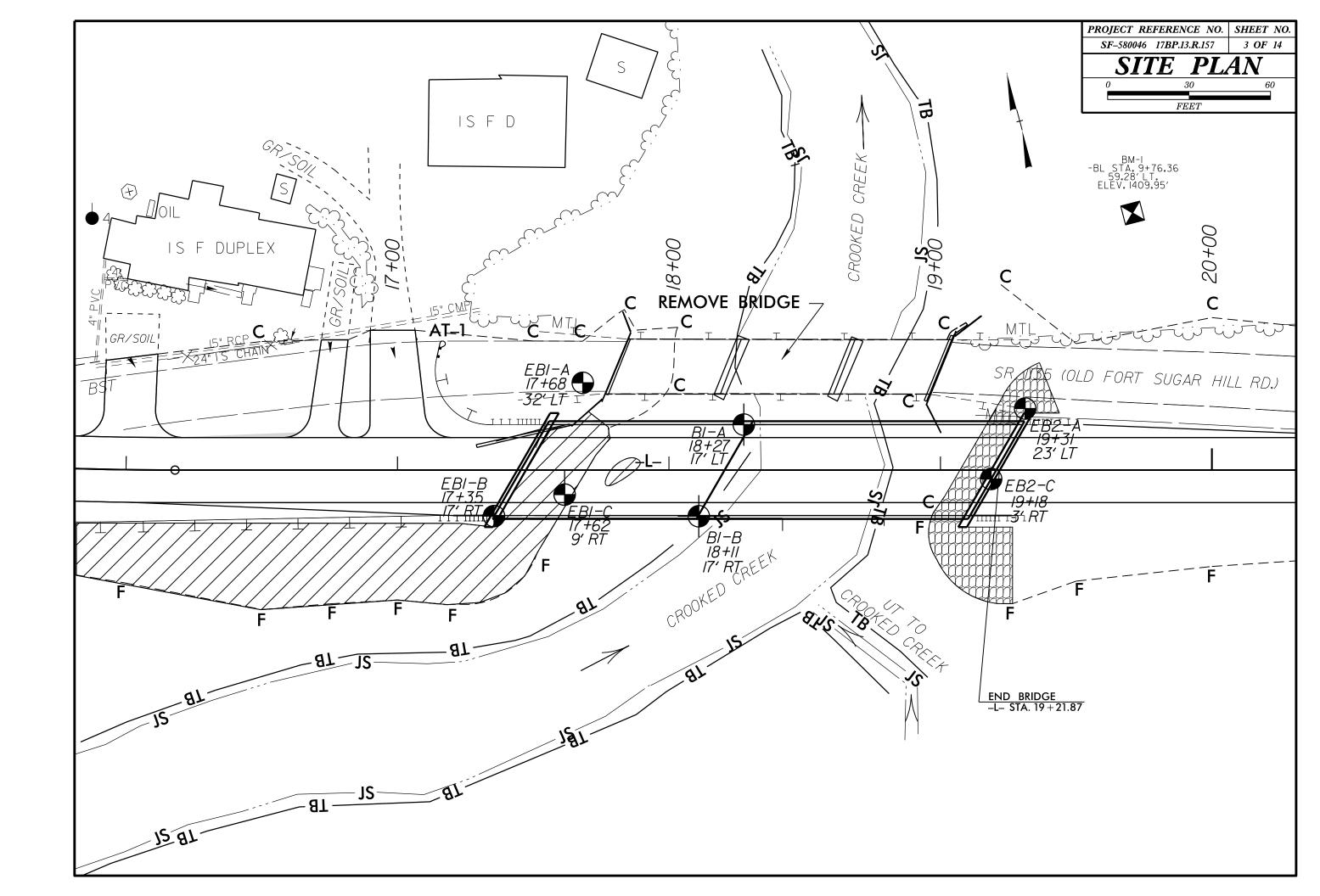
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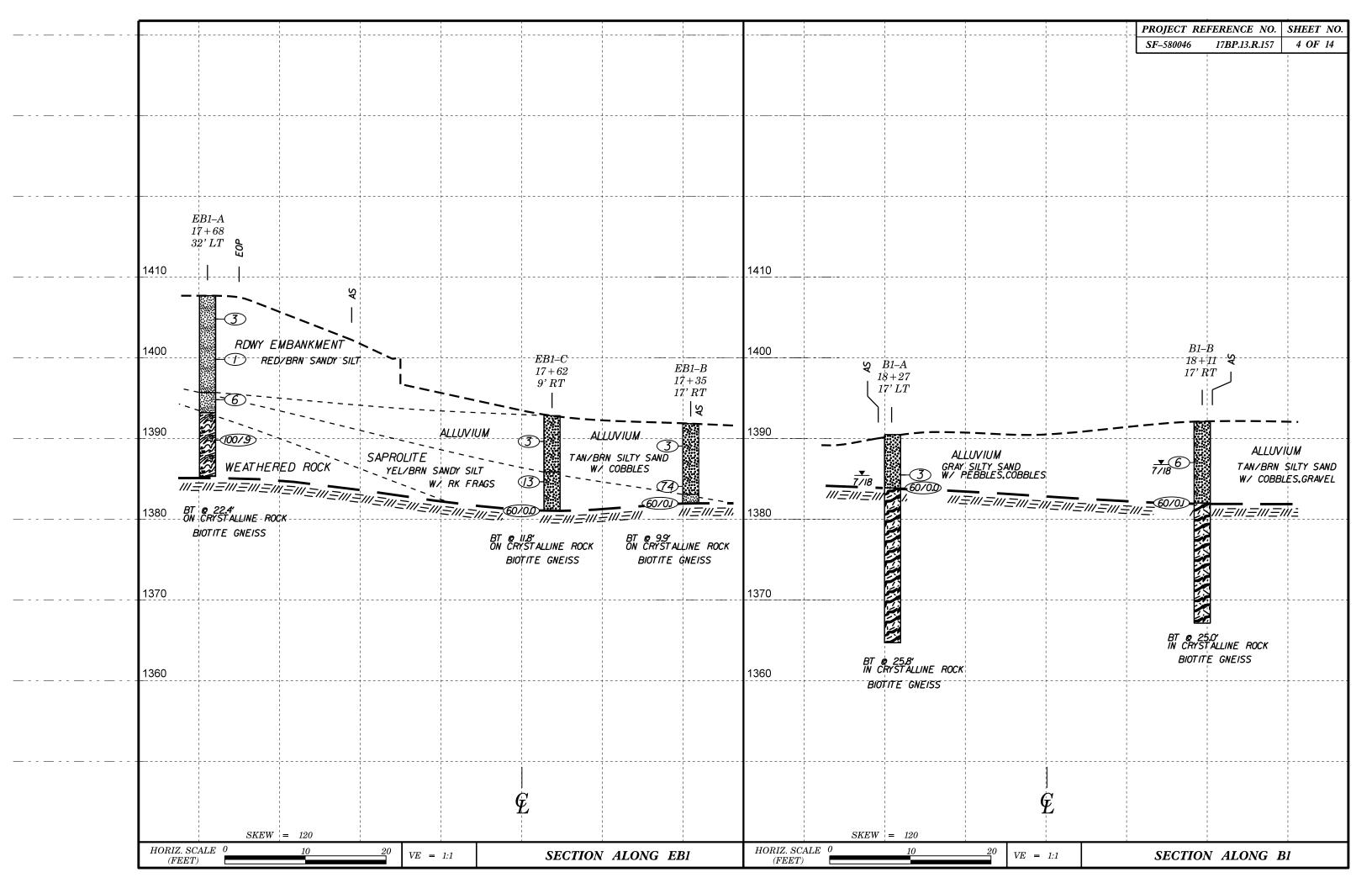
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

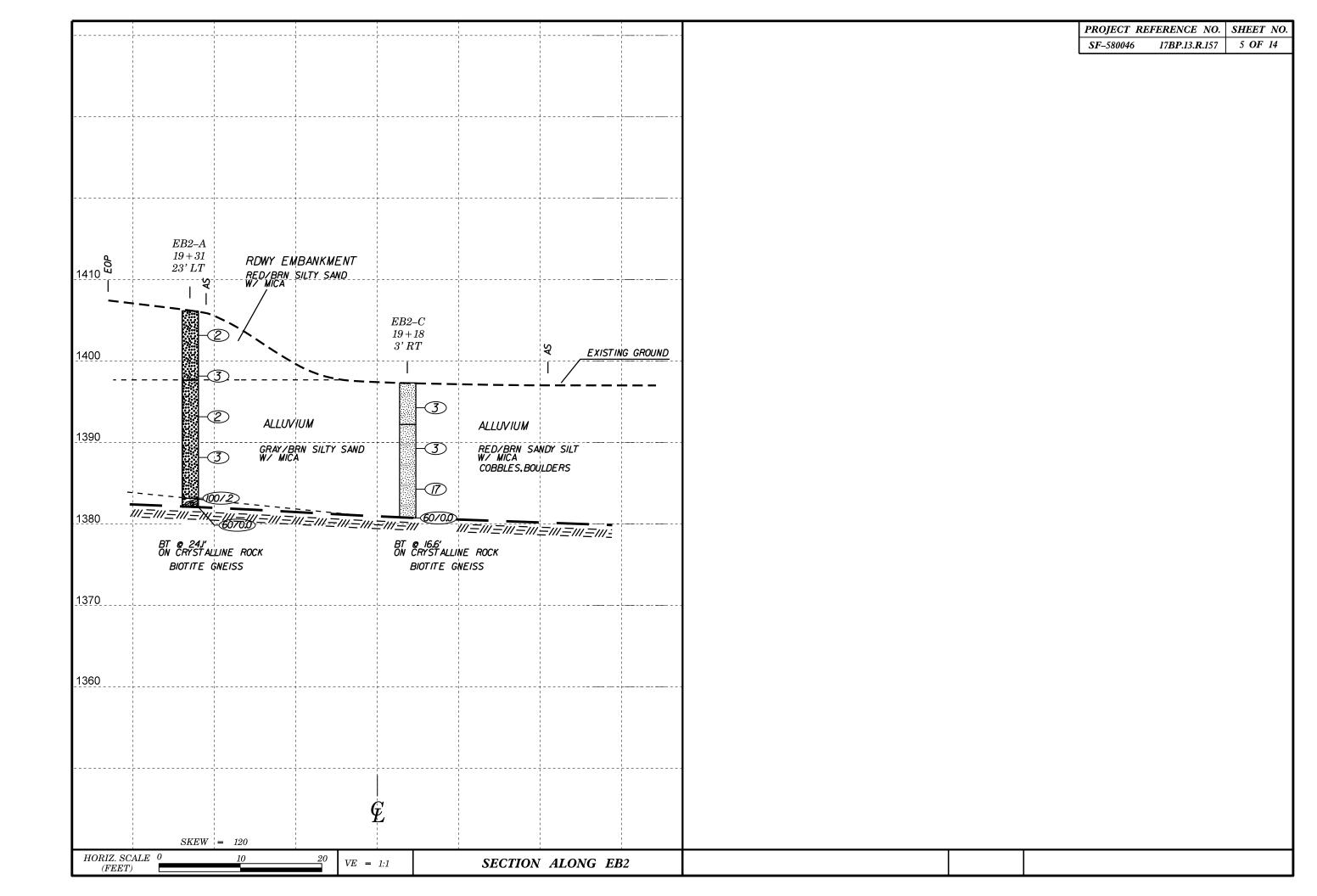
## SUBSURFA CE INVESTIGATION

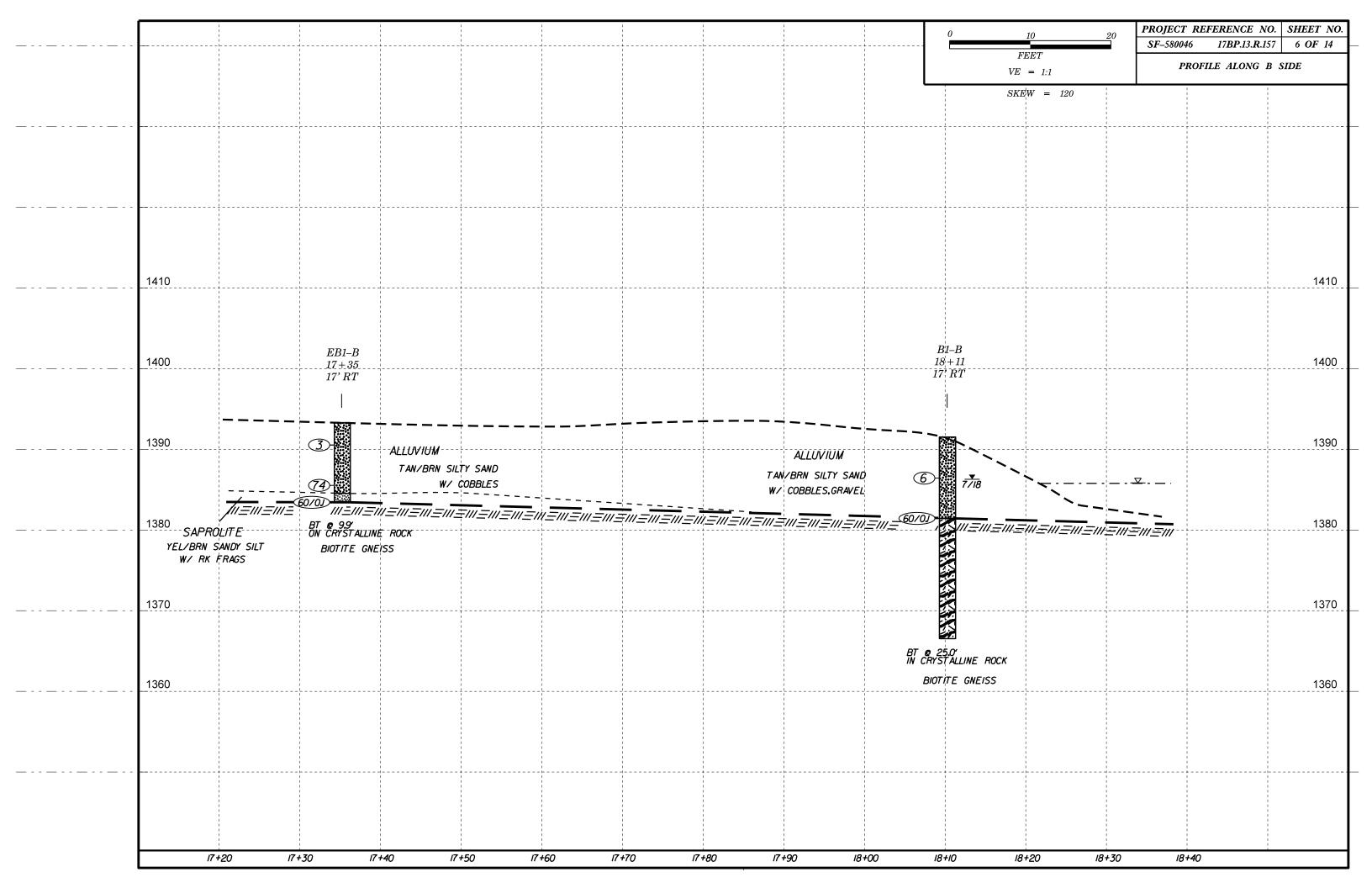
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

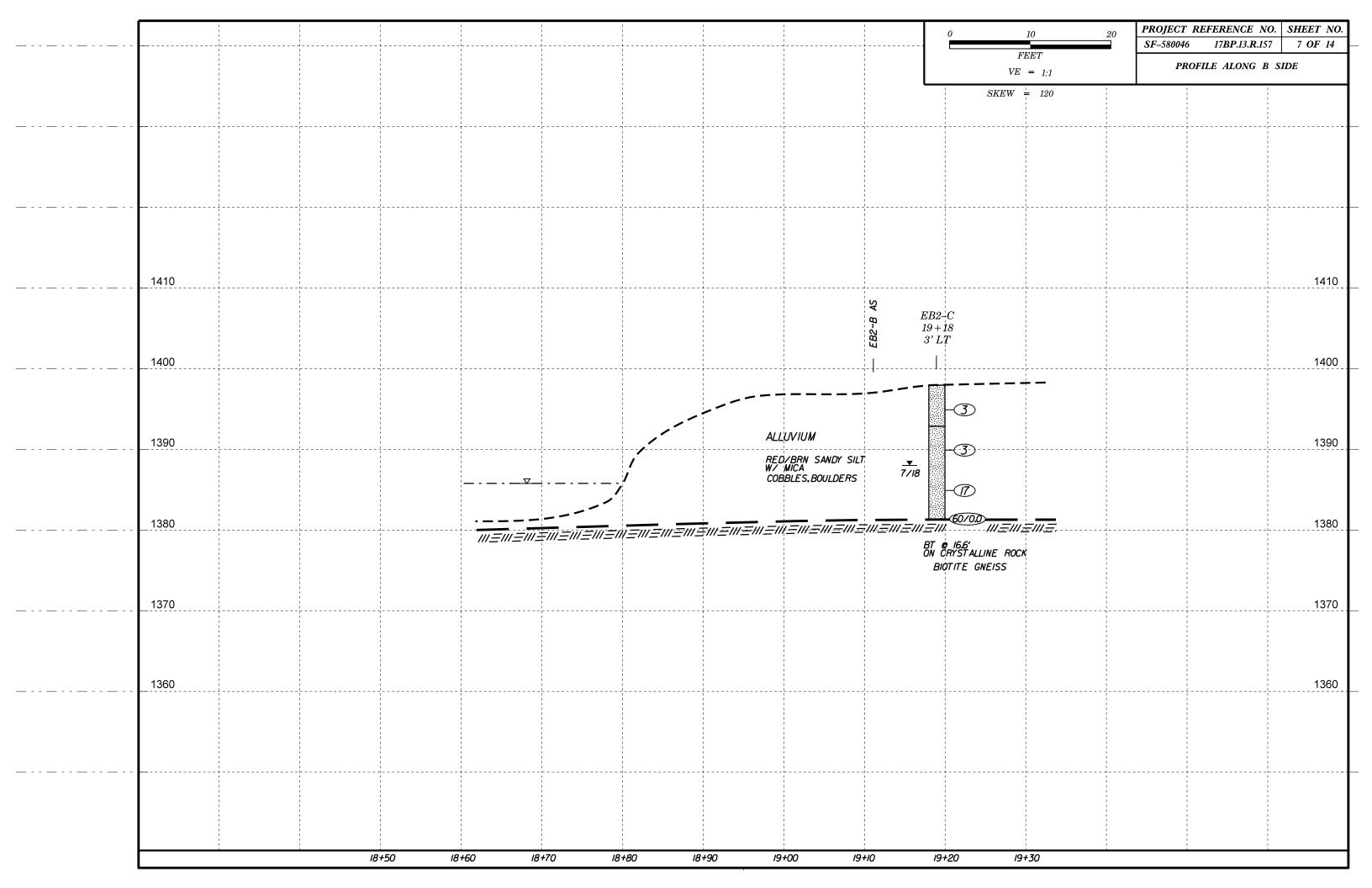
	FROM AASHIO I	LRFD BRIDGE DI	ESIGN SPECIFICATIONS			
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Joint	Rock Mass (Marinos and Hoek, 2000)	AASHT0	LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically	Deformed Hetero	geneous Rock Masse	s (Marinos and Hoek, 2000)
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)	s o o o o		OR HETEROGENEOUS ROCK MASSES SUCH YSCH (Marinos.P and Hoek E.,2000)			
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	VERY GOOD Very rough, fresh unweathered surfaces GOOD Rough, slightly weathered, iron stained surfaces Smooth, moderately weathered and altered surfaces Sinch surfaces Sinch compact coatings or fillings with compact coatings or fillings	sufface planes)  Strong Surface planes)  Strong Surface planes)  Sufface p	description of the lithology, structure and e conditions (particularly of the bedding ), choose a box in the chart. Locate the on in the box that corresponds to the condition discontinuities and estimate the average value from the contours. Do not attempt to be too e. Quoting a range from 33 to 37 is more cut than giving GSI = 35. Note that the from criterion does not apply to structurally alled failures. Where unfavourably oriented uous weak planar discontinuities are present, will dominate the behaviour of the rock mass. Trength of some rock masses is reduced by the ince of groundwater and this can be allowed for light shift to the right in the columns for fair, and very poor conditions. Water pressure does ange the value of GSI and it is dealt with by effective stress analysis.	(Predominantly bedding planes)  VERY GOOD - Very Rough, fresh unweathered surfaces	Rough, s	weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments  VERY POOR - Very smooth, slicken- sided or highly weathered surfaces
STRUCTURE	DECREASING SURFACE QUALITY	COMPO	OSITION AND STRUCTURE			
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities  BLOCKY - well interlocked un-	90 N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass, in shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70 60	A	
disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	70 60		B. Sand- stone with stone and thin inter- sulty shale sults shale or silty shale	nne /	50 B C	
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	50		stone with stone and this or silty shale silts thin inter-silts stone amounts or cilly stone layers of in similar amounts stone layers shale shale sands layer	with fone	40	
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	40 30	less for this do Tecton loss of	F. Tectonically deformed, intensively folded/faulted, inte	ne //		30 F 20
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces		20	G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers  The chapter structure with pockets of clay. Thin layers of			# <sub>10</sub>
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A N/A	10	into small rock pieces.  ➤ Means deformation after tectonic disturbance			DATE: 8-











#### SHEET 8 OF 14

#### GEOTECHNICAL BORING REPORT BORE LOG

													В	0	RE	L	<u>OG</u>							
		P.13.R.						B-58							McDO					GEOLOGIST Tidmore	e, Z. R.			
SITE	DESC	RIPTIO	N Re	place	e Bri	<del>-</del> -						For	t Sug	_			r Crook	ed Cre	eek	1		GROUI	ND WI	r (ft)
BORI	NG NC	). EB1	-A			S	TAT	ΓΙΟΝ	17	+68				OF	FSE	<b>T</b> 3	2 ft LT			ALIGNMENT -L-		0 HR.		Dry
COLI	AR EI	<b>.EV</b> . 1	,407.	8 ft		T	OTA	AL D	EPT	H 2	22.4 f	t		NC	DRTH	ING	689,9	03		<b>EASTING</b> 1,073,642		24 HR.		FIAD
DRILL	RIG/HA	MMER E	FF./D/	TE	TER	92-0 A	CKE	R REI	NEG/	ADE 8	36% 0	3/21/2	2016				DRILL N	IETHO	) Н.	S. Augers	HAN	IMER TYPE	Auton	natic
DRIL		Duggins	s, W.			S	TAF	RT D	ATE	04	/07/1	6		CC	OMP.	DAT	<b>E</b> 04/	07/16		SURFACE WATER DE	PTH	N/A		
ELEV	DRIVE ELEV	DEPT	''⊢—	LOW					_				FOO <sup>-</sup>				SAMP.	lacksquare	O	SOIL AND R	OCK DE	SCRIPTION	N	
(ft)	(ft)	(ft)	0.5	ft 0	).5ft	0.5ft	0		2	5		50		75	1	100	NO.	/MOI	G	ELEV. (ft)			DE	EPTH (ft
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		‡					Ц,												1888		ND SUF			0.0
1405		‡										:								<ul> <li>very soft to soft, r</li> </ul>	eddish b		y and	
1405	1,404.9	2.9	6	+	2	1		3				+-		_		-		М		<del>_</del> -	andy sil	t		
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1400	1,399.9	9 7.9	<u> </u>									<u> </u> :		:		_				<u>-</u>				
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1395	1,394.	9 12.9	WC	Н	2	4	-	<u> </u>				+-				-		M		_ R	ESIDUA Iowish b		— — — v silt	
		Ŧ						<u>•6</u>				+-		:+-				""	THE	WEAT	HERED	ROCK	,	14.5
1390	1 380 (	17.9										-		-		-				weathered	rock (bio	otite schist)		
	1,505.	+ 17.3	65	35	5/0.5							-			100/0	0.5				-				
		‡										-				-				<del>-</del> -				
		+	+	+	_		Н			-		-		•		- 1	-		1	- 1,385.4 Boring Termina	ed by A	uger Refus	al at	22.4
		‡																		Elevation 1,385	.4 ft on otite sch	crystalline re	ock	
		‡																			AIRE SOIT	131)		
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#### GEOTECHNICAL BORING REPORT BORE LOG

							T	<u>ORE L</u>						
WBS	3 17BP.13.R.1	57		TII	<b>P</b> SF-580	046	COUNT	Y McDOWE	LL			GEOLOGIST Johnson, C. D.		
_	DESCRIPTION		lace B				ver Crook	ed Creek				1	GROUND V	VTR (ft)
-	ING NO. EB1-0				TATION 1			OFFSET 9				ALIGNMENT -L-	0 HR.	Caved
	LAR ELEV. 1,3					<b>TH</b> 11.8 ft		NORTHING				<b>EASTING</b> 1,073,625	24 HR.	Dry
	RIG/HAMMER EF		AFO						DRILL M		H.S		ER TYPE Aut	omatic
	LER Cheek, D		W 001		ART DAT	E 07/17/1		COMP. DAT		7/18	L	SURFACE WATER DEPTH N/	A	
ELEV (ft)	DEPTH (ft)		W COL		0		PER FOO1 50	75 100	SAMP. NO.	MOI	O G	SOIL AND ROCK DESC ELEV. (ft)		DEPTH (ft)
1395	+										-	1,392.6 GROUND SURF.	ACE	0.0
1390	1,389.4 3.2	1	1	2				1 1		М	- - -	ALLUVIAL BROWN-TAN, SILTY-SANE COBBLES/GRAV		₹
1385	‡				\\; : :						-	1,385.6		7.0
1363	1,384.47 8.2	14	6	7	13.					М	-	- <b>SAPROLITE</b> WHITE/LIGHT BROWN, SI RK FRAGS		
	1.380.8 - 11.8	60/0.0						60/0.0				DK GREY/BLACK, BIOTI Boring Terminated WITH PENETRATION TEST R Elevation 1,380.8 ft ON CI ROCK	TE GNEISS STANDARD EFUSAL at	11.8

	В	ORE LOG		
<b>WBS</b> 17BP.13.R.157	TIP SF-580046 COUNT	Y McDOWELL	GEOLOGIST Johnson, C. D.	
SITE DESCRIPTION 41' IN-LINE,	UP-STATION 45' S OF SW CORNE	R EXISTING BRIDGE		GROUND WTR (ft)
BORING NO. EB1-B	STATION 17+35	OFFSET 17 ft RT	ALIGNMENT -L-	<b>0 HR</b> . Dry
<b>COLLAR ELEV.</b> 1,391.8 ft	TOTAL DEPTH 9.9 ft	<b>NORTHING</b> 689,864	<b>EASTING</b> 1,073,598	<b>24 HR</b> . Dry
DRILL RIG/HAMMER EFF./DATE AFO67	744 CME - 45C 92% 07/31/2017	DRILL METHOD H.S	. Augers HAMMI	ER TYPE Automatic
DRILLER Cheek, D. O.	<b>START DATE</b> 07/18/18	COMP. DATE 07/18/18	SURFACE WATER DEPTH N/	A
ELEV (ft) DEPTH BLOW COUNTY (ft) 0.5ft 0.5ft (	NT BLOWS PER FOO' 0.5ft 0 25 50	75 100 NO. MOI G	SOIL AND ROCK DESC ELEV. (ft)	CRIPTION DEPTH (fi
1390	2			
1,384.0 7.8 10 41 1.381.9 9.9	33	74 · · · M	- 1,383.0 1,381.9 SAPROLITE	
1,381.9_ 9.9 60/0.1		60/0.1	Dark grey-black sar  CRYSTALLINE R  Boring Terminated WITH PENETRATION TEST R Elevation 1,381.9 ft ON CF ROCK	ndy-silt  OCK  STANDARD REFUSAL at

SHEET 9 OF14

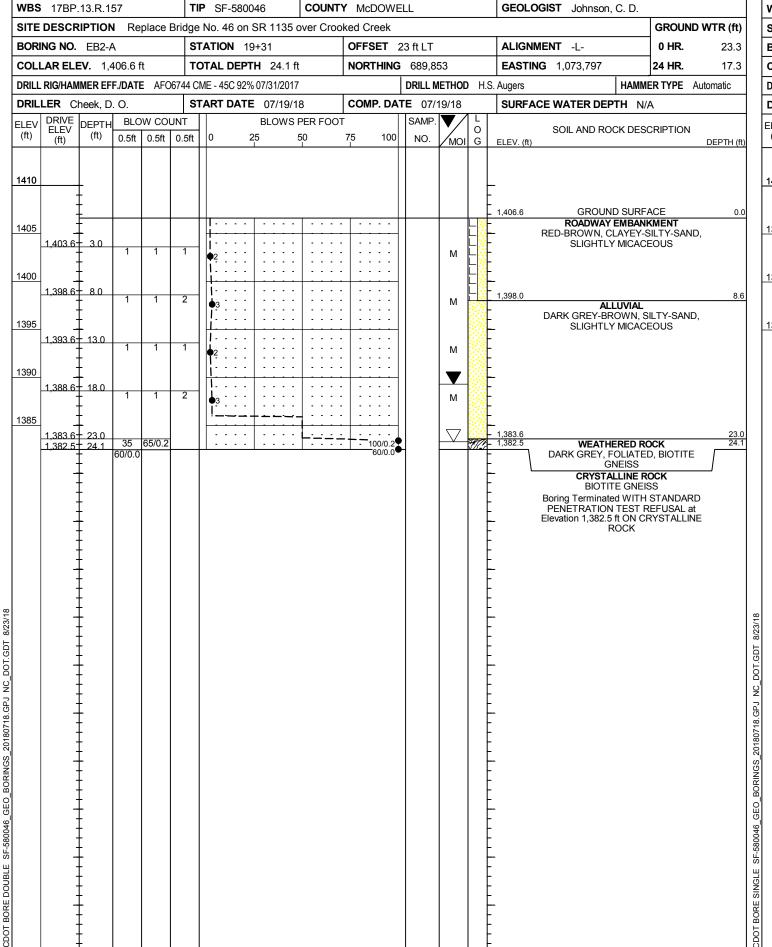
#### GEOTECHNICAL BORING REPORT CORE LOG

	E	BORE LOG				(	CORE LOG		
<b>WBS</b> 17BP.13.R.157	TIP SF-580046 COUN	TY McDOWELL	GEOLOGIST Johnson, C. D.		<b>WBS</b> 17BP.13.R.157		TY McDOWELL	GEOLOGIST Johnson, O	C. D.
SITE DESCRIPTION Replace	Bridge No. 46 on SR 1135 over Croo	oked Creek		GROUND WTR (ft)	SITE DESCRIPTION Replace Br	ridge No. 46 on SR 1135 over Cro	oked Creek	<u> </u>	GROUND WTR
BORING NO. B-1A	STATION 18+27	OFFSET 17 ft LT	ALIGNMENT -L-	<b>0 HR.</b> Dry	BORING NO. B-1A	STATION 18+27	OFFSET 17 ft LT	ALIGNMENT -L-	0 HR.
COLLAR ELEV. 1,390.5 ft	TOTAL DEPTH 25.8 ft	<b>NORTHING</b> 689,873	<b>EASTING</b> 1,073,696	<b>24 HR.</b> 5.1	<b>COLLAR ELEV.</b> 1,390.5 ft	TOTAL DEPTH 25.8 ft	<b>NORTHING</b> 689,873	<b>EASTING</b> 1,073,696	24 HR.
DRILL RIG/HAMMER EFF./DATE AFG	O6744 CME - 45C 92% 07/31/2017	DRILL METHOD NW	Casing W/SPT & Core HAMM	IER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE AFO6	744 CME - 45C 92% 07/31/2017	DRILL METHOD	NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Cheek, D. O.	<b>START DATE</b> 07/18/18	<b>COMP. DATE</b> 07/18/18	SURFACE WATER DEPTH N/	/A	DRILLER Cheek, D. O.	<b>START DATE</b> 07/18/18	<b>COMP. DATE</b> 07/18/18	SURFACE WATER DEPT	H N/A
ELEV DRIVE DEPTH BLOW CO	DUNT BLOWS PER FOO		SOIL AND ROCK DES	CRIPTION	CORE SIZE NW	TOTAL RUN 19.2 ft			
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI G	ELEV. (ft)	DEPTH (ft)	ELEV (ft) RUN DEPTH RUN RATE (Min/ft)	RUN   STRATA   REC.   RQD   NO.   (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)		DESCRIPTION AND REMARKS	<b>;</b>
						) (ii) (ii) NO. (ii) (iii)	G ELEV. (ft)		DEPT
1395					1383.86   1,383.9   6.6   4.2   N=60/0	0 (40) (12)	_ 1,383.9	Begin Coring @ 6.6 ft CRYSTALLINE ROCK	
					1,383.9 6.6 4.2 N=60/0.	95% 29%	1,383.9		
1390		50'00	1,390.5 GROUND SURF	ACE 0.0	1380 1,379.7 10.8	(4.9) (4.2)			
			DARK GREY, MOTTLED,	, SILTY-SAND		(4.9) (4.2) 98% 84%			
1,005 5			W/SOMÉ PEBBLES/C	CORRIES	1375 1,374.7 15.8				
1,385.5 5.0 1 1 1	2 3	w w	1,383.9	6.6	5.0	(5.0) (4.1) 100% 82%			
60/0.0		· — — 60/0.0 <del> </del>	CRYSTALLINE R BIOTITE GNEI	ROCK ISS		10070 0270			
1380					1370 1,369.7 20.8	(50) (50)			
		1 41 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				(5.0) (5.0) 100% 100%			
4075					1365 1,364.7 25.8		1,364.7		
1375			-				- Boring Termir	nated WITH CASING ADVANCER R 1,364.7 ft IN CRYSTALLINE RO	EFUSAL at Elevation CK
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							
1370									
		1 1 1 E-20 41							
1365									
1305			.1,364.7 Boring Terminated WIT	25.8 TH CASING					
			ADVANCËR REFUSAL at E ft IN CRYSTALLINE	Elevation 1,364.7 EROCK					
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# GEOTECHNICAL BORING REPORT CORE LOG

	1	BORE LOG			_					C	CORE L	LOG		
<b>WBS</b> 17BP.13.R.157	TIP SF-580046 COUI	NTY McDOWELL	GEOLOGIST Johnson, C. D.		WBS	17BP.13.R.157	•	TIP SF-	580046	COUNT	TY McDOW	ELL	GEOLOGIST Johnson,	C. D.
SITE DESCRIPTION Replace	Bridge No. 46 on SR 1135 over Cr	ooked Creek	GROUND WTR (ft)		SITE	DESCRIPTION	Replace B	ridge No. 46	on SR 1135 o	ver Croc	oked Creek		•	GROUND WTR
BORING NO. B-1B	STATION 18+11	OFFSET 17 ft RT	ALIGNMENT -L-	<b>0 HR</b> . N/A	BORI	ING NO. B-1B		STATION	<b>l</b> 18+11		OFFSET	17 ft RT	ALIGNMENT -L-	0 HR.
<b>COLLAR ELEV.</b> 1,392.0 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 689,845	<b>EASTING</b> 1,073,671	<b>24 HR.</b> 5.3	COLL	LAR ELEV. 1,39	2.0 ft	TOTAL D	<b>DEPTH</b> 25.0 f	t	NORTHING	<b>G</b> 689,845	<b>EASTING</b> 1,073,671	24 HR.
DRILL RIG/HAMMER EFF./DATE AFG	FO6744 CME - 45C 92% 07/31/2017	DRILL METHOD NV	V Casing w/ SPT HAMM	IER TYPE Automatic	DRILL	RIG/HAMMER EFF.	DATE AFO	6744 CME - 450	C 92% 07/31/2017	•	•	DRILL METHOD N	NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Cheek, D. O.	<b>START DATE</b> 07/19/18	COMP. DATE 07/19/18	SURFACE WATER DEPTH N/	/A	DRILI	LER Cheek, D. (	).	START D	DATE 07/19/1	8	COMP. DA	TE 07/19/18	SURFACE WATER DEP	TH N/A
ELEV $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$ $(ft)$	OUNT BLOWS PER FO	OOT SAMP. V	SOIL AND ROCK DES	COIDTION	CORE	E SIZE NW		TOTAL R	<b>RUN</b> 14.9 ft				<u> </u>	
(ft) (ft) (ft) 0.5ft 0.5ft	t 0.5ft 0 25 50	75 100 NO. MOI G		DEPTH (ft)	ELEV	RUN DEPTH F	RUN DRILL RATE	RUN REC. RQI (ft) (ft) (b) % %	SAMP. RE	STRATA EC. RQD ft) (ft) % %			DESCRIPTION AND REMARKS	c
					(ft)	(ft) (ft)	(ft)   RATE (Min/ft	(ft) (ft) %	NO.	ft) (ft) % %	G <sub>ELEV.</sub>	(ft)	DESCRIPTION AND REWARK	DEP1
1395			_		1381.92	2							Begin Coring @ 10.1 ft CRYSTALLINE ROCK	
			- ODOLIND OLIDE	105	1380	1,381.9 10.1	4.9 N=60/0	1.1 (4.9) (2.6   100%   53%	6)		_ 1,381.9	9	CRYSTALLINE ROCK	
			1,392.0 GROUND SURF ALLUVIAL		<del>1</del> 1 1	+								
1390		<del> </del>      🔯	TAN TO LIGHT BROW COARSE SILTY-SAND	D W/SOME		1,377.0 15.0	5.0	(5.0) (3.8	3)		1,367			
1,386.9 5.1		· ·   · · · ·           🛖 🔯	COBBLES, GRA	VELS	1375	1 + 1		100% 76%	%					
1385	2   •6		<u>.</u>			1,372.0 20.0								
			• •		1370	<u> </u>	5.0	(5.0) (5.0 100% 100°	0)   %					
1,381.9 10.1 60/0.1		60/0.1	_ 1,381.9 CRYSTALLINE R	10.1	<b>1</b>									
1380			BIOTITE GNEI	ISS		1,367.0 25.0			$\dashv$		1,367.	Boring Terminate	ed WITH CASING ADVANCER F	REFUSAL at Elevation
			<u>-</u>			+					1 -		1,367.0 ft IN CRYSTALLINE RO	OCK
375			-								1 -			
$\Box$ $\mp$ $+$			-			<u> </u>					E			
			-			Ŧ					1 F			
1370			- <del>-</del>								F			
<del> </del>			- - 1,367.0	25.0		‡					F			
+			Boring Terminated WIT	TH CASING Elevation 1 367 0	]						F			
			ft IN CRYSTALLINE	E ROCK							F			
			<del>-</del>								F			
			- <del>-</del>											
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#### COUNTY McDOWELL **TIP** SF-580046 GEOLOGIST Johnson, C. D.



# GEOTECHNICAL BORING REPORT

BORE LOG           WBS 17BP.13.R.157         TIP SF-580046         COUNTY McDOWELL         GEOLOGIST Johnson, C. D.																	
								l					GEOLOGIST Johnson, C. D.				
	DESCR			place			o. 46 on SR 1135 o	over Croc	1				T		GROUND V		
BORING NO. EB2-C STATION 19+19									OFFSET 3 ft RT				ALIGNMENT -L-		0 HR.	Dry	
	LAR ELE					<b>AL DEPTH</b> 16.6 ft		NORTHING 689,831  DRILL METHOD H.S							9.9		
DRILL RIG/HAMMER EFF./DATE AFO6744 CME - 45C 92% 07/31/2017												) H.S	<u> </u>			omatic	
DRIL	LER C					TAR	RT DATE 07/17/1		COMP. DATE 07/17/18				SURFACE WATER DEPT	SURFACE WATER DEPTH N/A			
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	W CO	0.5ft	0		PER FOO	75 100	SAMP.	MOI	0	SOIL AND ROC ELEV. (ft)	K DESC		DEPTH (ft)	
1400	-	<del>-</del> -										<u>-</u>	_				
	-	-				+1.							- 1,397.3 GROUND	SURFA JVIAL	ACE	0.0	
1395	1,394.3	- - 3.0 -	1	1	2	1   1.   <b>♦</b> 3					М		BROWN-TAN, SANI WITH SOME COE 1,392.2			<b>J</b> 5.1	
1390	-	- -				!·							ALLI RED-BROWN, SAND	JVIAL	EINIE CDAIN		
1390	1,389.3	- 8.0 - -	1	1	2	<del> </del>					<b>√</b> Mp		SLIGHTLY MICA COBBLES/	CEOUS	W/SOME	,	
1385	- 1,384.3	- 12.0				1.							- <del>-</del>				
	-	- - -	25	10	7	',					М		- - - - 1,380.7			16.6	
	1,380.7-	- 16.6 -	60/0.0					<u> </u>	60/0.0	•		689279	CRYSTAL - BIOTITE			10.0	
													Boring Terminated PENETRATION Flevation 1,380.7 fl RC	TEST R	EFUSAL at		

### **CORE PHOTOGRAPHS**

**B1-A** 

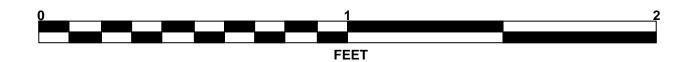
**B1-A BOX 1: 6.6 - 15.8 FEET BOX 2: 15.8 - 25.8 FEET** 

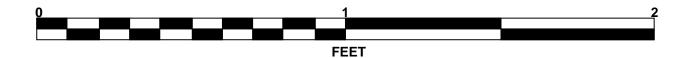




GSI = 55 to 65

GSI = 55 to 65 at 6.6 to 19' GSI = 65 to 75 below 19'





### **CORE PHOTOGRAPHS**

B1-B

B1-B **BOX 1: 10.1 - 18.7 FEET BOX 2: 18.7 - 25.1 FEET** 





GSI = 40 to 50 from 10.1 to 18.4'

GSI = 70 to 80 from 18.4 to 25.0'

